IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of :

Takashi Sasaki et al. :

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GOLF BALL :

DECLARATION

I, Takashi SASAKI, residing in c/o SRI Sports Limited, 6-9, 3-Chome, Wakinohama-cho, Chuo-ku, Hyogo-ken, Japan, declare and say as follows:

1. I am one of inventors of the above-identified application.

2. In 1987, I was graduated from Hokkaido University and received a Bachelor's degree in Applied Chemistry from said University.

3. Since 1987 to June, 2003, I had been employed by Sumitomo Rubber Industries, Ltd. as a researcher. I had been mainly engaged in researches of material for golf balls, during which I had experienced within the period of January, 1990 to December, 1995 in researches of tennis balls. The sports division of said company was spun out from said company and has established SRI Sport Limited. I have been employed by SRI Sport Limited since June, 2003 and still engaged in researches of golf balls. I have enough technical knowledge about golf balls.

4. With respect to the above-identified application, some experiments were carried out under my direction and supervision, and I beg to submit herewith the exact report thereon.

Experiments 1 to 3 and Comparative Experiments 1 and 2

Production of core

The rubber composition for the core having the formulation shown in Table 1 was mixed, and then vulcanized by press-molding at 165°C for 20 minutes in the mold to obtain spherical core. The weight, diameter and deformation amount of the resulting core were measured, and the results are shown in the same Table 1.

Table 1 (Preparation of core)

	Ex. 1	Ex. 2	Ex.3	Comp. Ex. 1	Comp. Ex. 2
Polybutadiene	100	100	100	100	100
Zinc acrylate	36	32	24	40	22
zinc oxide	7.5	9.1	12.5	5.8	13.2
Diphenyldisulfide	0.5	0.5	0.5	0.5	0.5
Dicumyl peroxide	0.9	0.9	0.9	0.9	0.9
Weight (g)	36.6	36.6	36.6	36.6	36.6
Diameter (mm)	39.8	39.8	39.8	39.8	39.8
Core deformation (mm)	2.5	3.2	4.5	2.0	5.0

Preparation of cover compositions

The formulation materials showed in Table 2 (Examples) and Table 3 (Comparative Examples) were mixed using a kneading type twin-screw extruder to obtain pelletized cover compositions. The extrusion condition was,

a screw diameter of 45 mm,

a screw speed of 200 rpm,

a screw L/D of 35.

The formulation materials were heated at 200 to 260°C at the die position of the extruder. The hardness were determined, using a sample of a stack of the three or more heat and press molded sheets having a thickness of about 2 mm from the cover composition, which had been stored at 23°C for 2 weeks, with a Shore D hardness meter according to ASTM D 2240-68. The results are shown as a cover hardness in Tables 2 to 5.

Table 2 (Preparation of cover)

	Ex.1	Ex. 2	Ex. 3	Comp. Ex. 1	Comp. Ex. 2
Elastollan XNY90A	100	100	100	100	100
Titanium oxide	4	4	4	4	4
Thickness (mm)	1.5	1.5	1.5	1.5	1.5
Shore D hardness	41	41	41	41	41

*4: Elastollan XNY90A (trade name), polyurethane-based thermoplastic elastomer formed by using 4,4'-dicyclohexylmethane diisocyanate ($H_{12}MDI$) (=hydrogenated MDI), commercially available from BASF Polyurethane Elastomers Co., Ltd.

The cover composition was covered on the core obtained as described above by injection molding to form a cover layer having the thickness shown in Table 3. Then, paint was coated on the surface of the cover layer to obtain a golf ball having a diameter of 42.8 mm and a weight of 45.3 g. With respect to the resulting golf balls, the deformation amount, coefficient of restitution, flight distance, shot feel, controllability, yellowing resistance and scuff resistance were measured or evaluated. The results are shown in Table 3. The test methods are as follows.

(Test method)

(1) Deformation amount

The deformation amount is determined by measuring a deformation amount, when applying from an initial load of 98 N to a final load of 1275 N on the golf ball.

(2) Coefficient of restitution

An aluminum cylinder having a weight of 200 g was struck at a speed of 45 m/sec against a golf ball, and the velocity of the cylinder and the golf ball after the strike were measured. The coefficient of restitution of the golf ball was calculated from the velocity and the weight of both the cylinder and the golf ball. The measurement was conducted 5 times for each golf ball, and the average is shown as the coefficient of restitution of the golf ball

(3) Flight performance

A No. 1 wood club (W#1, a driver) having metal head was mounted to a swing robot manufactured by True Temper Co. and the resulting golf ball was hit at a head speed of 45 m/second, the flight distance were measured. As the flight distance, total that is a distance to the stop point of the hit golf ball was measured. The measurement was conducted 12 times for each golf ball (n=5), and the average is shown as the result of the golf ball.

(4) Shot feel

The shot feel of the golf ball is evaluated by 10 golfers according to a practical hitting test using a No. 1 wood club (W#1, a driver) having a metal head. The evaluation criteria are as follows. The results shown in the Tables below are based on the fact that the most golfers evaluated with the same criterion about shot feel.

Evaluation criteria

o: The golfers felt that the golf ball has good shot feel such that impact force at the time of hitting is small and rebound characteristics are good.

Δ: The golfers felt that the golf ball has fairly good shot feel.

x: The golfers felt that the golf ball has poor shot feel such that impact force at the time of hitting is large or the golf ball has heavy and poor shot feel.

(5) Controllability

The controllability of the golf ball is evaluated by 10 golfers according to a practical hitting test using a pitting wedge (PW). The evaluation criteria are as follows. The results shown in the Tables below are based on the fact that the most golfers evaluated with the same criterion about controllability.

Evaluation criteria

o: The golfers felt that it is easy to apply spin on the golf ball, and the golf ball has good controllability.

Δ: The golfers felt that the golf ball has fairly good controllability.

x: The golfers felt that it is difficult to apply spin on the golf ball such that the golf ball slips on the face of golf club, and the golf ball has poor controllability.

(6) Yellowing resistance

The resulting golf ball was exposed to a sunshine weather meter manufactured by Suga Test Instruments Co., Ltd. for 120 hours. The color difference (ΔL, Δa and Δb) of the surface of the golf ball between before and after the exposure was measured by using a color-difference-colorimeter, which is commercially available from Minolta Co., Ltd. under the trade name "CR-221", and was represented by ΔE. The ΔE is determined by using the following formula:

$$\Delta E = [(\Delta L)^2 + (\Delta a)^2 + (\Delta b)^2]^{1/2}$$

The larger the value of color difference ΔE is, the less the yellowing resistance is.

(7) Scuff resistance

After a pitching wedge commercially available was mounted to a swing robot manufactured by True Temper Co., two points on the surface of each golf ball was hit at a head speed of 36 m/sec one time for each point. The two points were evaluated by checking the surface appearance by visual observation. The evaluation criteria are as follows.

Evaluation criteria

o : The surface of the golf ball slightly has a cut, but it is not particularly noticeable.

Δ : The surface of the golf ball clearly has a cut, and the surface becomes fluffy.

x : The surface of the golf ball is considerably chipped off, and the surface noticeably becomes fluffy.

(Test results)

Table 3

	Ex. 1	Ex. 2	Ex. 3	Comp. Ex. 1	Comp. Ex. 2
Ball weight (g)	45.3	45.3	45.3	45.3	45.3
Ball deformation (mm)	2.40	3.05	4.25	1.90	4.65
Coefficient of restitution	0.772	0.761	0.745	0.779	0.739
Flight distance (m)	213	211	208	215	205
Shot feel	Δ	O	Δ	x	x
Controllability	O	O	O	O	O
Yellowing resistance (ΔE)	1.8	1.8	1.8	1.8	1.8
Scuff resistance	O	O	O	O	O

CONCLUSION

As is apparent from the above results, the golf balls of Experiments 1 to 3 satisfy the core deformation ranges claimed in the present application, but those of Comparative Experiments 1 and 2 were outside the core deformation ranges of the present invention. The golf ball of Comparative Experiment 1 had smaller core deformation of 2.0 mm and show poor in shot feel. The golf ball of Comparative Experiment 2 had larger core deformation of 5.0 mm and is too soft and shows heavy and poor in shot feel.

5. It is declared by undersigned that all statements made herein of undersigned's own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S. Code 1001 and that such willful false statements may be jeopardize the validity of this application or any patent issuing thereon.

Takashi Sasaki

Takashi SASAKI

Dated this 7 th day of November , 2003